11-2015

Living arrangements and psychological well-being of the elderly after the economic transition in Vietnam

Ken YAMADA
Singapore Management University, kenyamada@smu.edu.sg

Bussarawan TEERAWICHITCHAINAN
Singapore Management University, bteerawichit@smu.edu.sg

DOI: https://doi.org/10.1093/geronb/gbv059

THE GERONTOLOGICAL SOCIETY OF AMERICA®

Journals of Gerontology: Social Sciences
cite as: *J Gerontol B Psychol Sci Soc Sci*, 2015, Vol. 70, No. 6, 957–968
doi:10.1093/geronb/gbv059
Advance Access publication August 25, 2015

OXFORD

Original Article

Living Arrangements and Psychological Well-Being of the Older Adults After the Economic Transition in Vietnam

Ken Yamada[1,2] and Bussarawan Teerawichitchainan[3]

[1]Faculty of Economics, Kyoto University, Japan. [2]School of Economics and [3]School of Social Sciences, Singapore Management University.

Correspondence should be addressed to Ken Yamada, PhD, Faculty of Economics, Kyoto University, Yoshida-honmachi, Sakyo-ku, Kyoto 606-8501, Japan. E-mail: yamada@econ.kyoto-u.ac.jp.

Received July 17, 2014; Accepted June 7, 2015

Decision Editor: Merril Silverstein, PhD

Abstract

Objectives: We examine the relationship between living arrangements and psychological well-being of the older adults in Vietnam, where there is an influence of Confucian values and a lack of close substitutes for family care of the older adults, by exploiting a great deal of regional variation in economic development. We also examine the role of living arrangements in well-being differentials across regions.

Method: We estimate a triangular simultaneous-equation discrete-response model, which accounts for the simultaneity between living arrangements and psychological well-being (happiness, depression, loneliness, poor appetite, and sleep disorder), using a nationally representative sample of 2,225 adults aged 60 and older drawn from the 2011 Vietnam Aging Survey.

Results: Intergenerational coresidence significantly increases the psychological well-being of the older adults in Vietnam. The results are fairly robust, even after taking quasi-coresidence into account, decomposing the psychological well-being index into each affect and symptom, and splitting the sample by gender.

Discussion: Changes in living arrangements induced by differences in labor market opportunities in neighboring regions have resulted in significant differences in psychological well-being among the older adults. The findings point to the need for attention to the mental health of elderly parents left behind in less economically developed regions.

Key Words: Elderly left behind—Intergenerational coresidence—Internal migration—Psychological well-being

Intergenerational coresidence has been widely regarded as a linchpin of old-age support in developing countries, where the public pension, universal health care, and long-term care systems and other old-age safety nets are underdeveloped (Chan, 2005; Hermalin, 2002). In addition to its old-age support functions, living with a child is also considered a manifestation of filial piety in Asian societies, especially in those influenced by Confucianism (Croll, 2006). Zhang, Gu, and Luo (2014) demonstrate an association between filial piety and intergenerational coresidence

in China, whereas Cheng and Chan (2006) demonstrate an association between filial piety and psychological well-being among Chinese older adults. Intergenerational coresidence may be closely linked to the psychological well-being of the older adults in developing Asian countries.

A burgeoning literature documents an association between living arrangements and psychological well-being of the older adults. Silverstein, Cong, and Li (2006) find a positive association between intergenerational coresidence and psychological well-being of the older adults in rural China. Do and Malhotra (2012) find a protective effect of intergenerational coresidence on depressive symptoms of elderly widowed women in Korea. Tiedt (2013) finds a protective effect of intergenerational coresidence on depressive symptoms of the older adults in Japan but not on those of the older adults in the United States. To date, however, there is only limited evidence on whether the association is causal and to what extent living arrangements affect the psychological well-being of the older adults. The main reason for this is the simultaneity between living arrangements and psychological well-being. Despite a greater need for the analysis in developing Asian countries, the lack of nationally representative surveys of the older adults in these countries makes it particularly challenging to utilize plausibly exogenous variation in living arrangements, which is needed to overcome the simultaneity problem.

Toward a better understanding of the welfare of the older adults, we examine the relationship between living arrangements and psychological well-being of the older adults, using the Vietnam Aging Survey, the first nationally representative survey of the older adults in Vietnam. Vietnam is typically characterized by Confucian values and a lack of close substitutes for family care of the older adults. The population of Vietnam is aging rapidly. The total fertility rate is only 1.89 in the 2005–2010 period, as opposed to 6.47 in the 1965–1970 period, and the proportion of people aged 60 and older is projected to increase from 9% in 2010 to 31% in 2050 (United Nations, 2013). In addition, the rural–urban migration of young people has become more common (General Statistics Office of Vietnam, 2011). These demographic changes reducing the likelihood of living with an adult child have been raising concerns over the welfare of the older adults (Barbieri, 2009; Knodel, Friedman, Truong, & Bui, 2000).

The main contribution of this article is to estimate the causal effect of living arrangements (such as coresidence and quasi-coresidence) on the psychological well-being (such as happiness, depression, loneliness, poor appetite, and insomnia) of the older adults. The key idea is that we can consider intergenerational coresidence to be a consequence of the choice of residential location along the lines of economic theory and evidence on internal migration (see Greenwood, 1997; Lucas, 1997, for surveys). In Vietnam, there is a great deal of regional variation in economic development after the transition from a collective to a market economy as a result of the *Doi Moi* (renovation) reforms since the late 1980s (Barbieri, 2009; Glewwe, 2004). The transition to a market economy has created considerable regional variation in economic and labor market conditions (Gallup, 2004). This change induced young adults to migrate toward more developed neighboring regions (Dang, Goldstein, & McNally, 1997). Suppose, consequently, that a significant regional variation in the rate of coresidence between elderly parents and adult children depends on labor market opportunities in neighboring regions. We can then exploit differences in labor market opportunities in neighboring regions as exogenous variation in living arrangements to identify the impact of living arrangements on the psychological well-being of the older adults. More specifically, the theory underlying our approach can be schematically summarized as follows.

$$\text{Economic transition} \Rightarrow \text{Regional variation} \Rightarrow \text{Migration} \Rightarrow \text{Living arrangements} \Rightarrow \text{Psychological well-being.}$$

The question we address in this article is that whether the changes in living arrangements caused by structural changes in the economy have resulted in significant differences in psychological well-being among the older adults.

The remainder of the article proceeds as follows. Method section describes the data, variables, and methods used in the analysis. Results section provides descriptive statistics and estimation results regarding the impact of living arrangements on psychological well-being and examines the implications for well-being differentials across regions. The last section provides discussion and conclusions of the study.

Method

Data

The Vietnam Aging Survey is the first nationally representative survey of the older adults in Vietnam conducted in 2011 jointly by the Institute of Social and Medical Studies and Indochina Research and Consulting under the sponsorship of the Vietnam Women's Union. The universe for the survey is the near-elderly and elderly adults aged 50 and older in Vietnam. Approximately 4,000 people were surveyed in 200 communes of 12 provinces intended to be representative of all ecological regions of Vietnam (the Northern Uplands, the Red River Delta, the North and South Central Coasts, the Central Highlands, the Southeast, and the Mekong River Delta). The survey used a multistage stratified sampling design (see Vietnam Women's Union, 2012, for details). This study initially includes 2,698 older adults aged 60 and older who had at least one living child at the time of the survey. After excluding those who had proxy responses or no response to questions used in the analysis, 2,225 older adults remain in the sample. We weigh all observations by the sampling weight.

Measures

We first describe the two key variables, psychological well-being and living arrangements, that we treat as endogenous variables and then turn to other variables, including demographic characteristics, functional health, assets, intergenerational transfers, and regional characteristics, that we consider as factors determining psychological well-being and living arrangements.

Psychological Well-Being

We assess psychological well-being using five questions, of which one is on feelings of positive affect (happiness), two are on feelings of negative affect (depression and loneliness), and two are somatic symptoms (poor appetite and insomnia). The questions related to mental health are adapted from the Center for Epidemiologic Studies Depression scale and the 36-item short-form instrument (Radloff, 1977; Ware & Sherbourne, 1992). We code the frequency with which the older adults experienced a feeling of happiness in the past week as 2 (*most of the time*), 1 (*some of the time*), or 0 (*not at all*) and reverse code the frequency with which they experienced each negative affect and somatic symptom in the past week as 0 (*most of the time*), 1 (*some of the time*), or 2 (*not at all*). We sum these five indices to form an overall well-being score ranging from 0 to 10, where a higher score indicates an increased level of well-being. The mean overall well-being score is 6.8, and the mean component score ranges between 0.9 and 1.7.

Living Arrangements

We categorize living arrangements by whether the older adults live with their children (including biological, adopted, and step children) and whether they live close to their children. We code coresidence as 1 if they live in the same house and 0 otherwise (such as if they live next door; in the same village, the same commune, the same district, and the same province; in other provinces; or in other countries) and coresidence including quasi-coresidence as 1 if they live in the same house or next door and 0 otherwise. For the sample used in the analysis, the mean age of respondents is 70 years, whereas the mean age of their children is 39 years. Coresidence between elderly parents and adult children is common at 66% in Vietnam. Of the older adults who do not live with their children, 41% live next door to their children. The rate of coresidence including quasi-coresidence is 80%.

Demographic Characteristics

We consider demographic characteristics, including age, gender, marital status, the number of sons, the number of daughters, the mean age of children, the presence of grandchildren, and religion, as possible determinants of psychological well-being and living arrangements. Current marital status is measured as a binary variable that takes a value of 1 if married and 0 if single, divorced, separated, or widowed. Religion is measured as a binary variable that takes a value of 1 if they are not formally affiliated with any religion and 0 if affiliated with any religion, including Buddhism, Catholicism, Protestantism, Hoa Hao, Cao Dai, Islam, Luong, and others. We do not further divide categories according to religions because we find no significant difference in psychological well-being across religions, holding other factors constant. The average number of sons and daughters are 2.5 and 2.4, respectively.

Functional Health

We assess functional health using 12 questions on the degree of difficulty in performing activities of daily living (ADL, such as eating, getting dressed and undressed, bathing/washing, getting up, and using the toilet) and instrumental activities of daily living (such as walking, lifting/carrying, crouching/squatting, grasping/holding, walking up and down, standing up, and extending arms). We assign a score of 0 to the response indicating no problem, a score of 1 to the response indicating mild or moderate difficulty, and a score of 2 to the response indicating severe difficulty or cannot do at all. To make use of all information available without causing multicollinearity, we measure functional limitations as the sum of the 12 indices ranging from 0 to 24. We are aware of the potential simultaneity problem arising from this variable and confirm that the results remain unchanged regardless of including or excluding the variable, although we present the results when controlling for functional health.

Assets

We construct an asset variable by performing a nonparametric regression of financial assets (savings) of the older adults on dummies for educational attainment and the main lifetime occupation in order to deal with measurement error and missing data. This variable can be interpreted as a composite index reflecting the older adult's socioeconomic characteristics (Of the older adults in the sample, 50% were own-account workers in an agricultural sector, 19% were own-account workers in a nonagricultural sector, 28% were wage workers, and the rest includes employers, unpaid family workers, and nonworkers. Broadly classified, 45% did not complete primary education, 19% completed primary education, 31% completed secondary education, and 5% completed tertiary education). This measure of assets is preferable to a measure of household wealth based on the number of household possessions (see Filmer & Pritchett, 2001, for details), because such durable goods are simultaneously determined with living arrangements.

Intergenerational Transfers

We measure financial and in-kind transfers by the number of children from whom the older adults received financial help in the past year and the number of children from whom the older adults received gifts in the past year worth more than 500,000 Vietnamese dong,

approximately 24 U.S. dollars. We are aware of the potential simultaneity problem arising from these two variables and confirm that the results remain unchanged regardless of including or excluding the two variables. We present the results when the two variables are included as controls in order to highlight the fact that living arrangements have a significant effect on psychological well-being even after accounting for financial and in-kind transfers from children.

Regional Characteristics

Regional characteristics we consider are mainly local economic and labor market conditions. We use monthly income per capita and unemployment rate from the 2010 Vietnam Household Living Standards Survey and the 2011 Labour Force Survey, respectively, that are conducted every other year and annually by the General Statistics Office of Vietnam. We calculate unemployment rate outside the region as the weighted average of unemployment rates in the other regions, where the weight is given by the inverse of the distance across regions (as a proxy for migration costs) and normalized in a way that the sum of the weights equals 1. For example, when we calculate unemployment rate outside the region for the Southeast, we give the highest weight to unemployment rate in the closest region, the Mekong River Delta, and the lowest weight to unemployment rate in the farthest region, the Northern Uplands. This variable plays a key role as an instrumental variable in accounting for the endogeneity of living arrangements, as described later. The distance across regions is measured using the distance between the main railway stations, given the fact that Vietnam is a long, narrow S-shaped country, where the railway passes through most provinces from north to south (see World Bank, 2006, for transport infrastructure and services in Vietnam). In addition, we include an indicator for north regions to control for other regional differences that could not be captured by the regional variables mentioned earlier. We code north regions as 1 for the Northern Uplands, the Red River Delta, and the North Central Coast and 0 for the South Central Coast, the Central Highlands, the Southeast, and the Mekong River Delta. Because we use the data from a single cross-sectional survey, there is no need to include national-level characteristics in the analysis.

Model

Psychological well-being is measured by an ordinal index ranging from 0 to 10. To avoid the assumption of cardinality, we adopt an ordered response model, where psychological well-being is treated as a latent variable (y_1^*). Living arrangements are measured by a binary indicator and are treated as a latent variable (y_2^*). To solve the simultaneity problem, we consider the following triangular system of two equations that determine psychological well-being and living arrangements:

$$y_1^* = \beta y_2^* + \gamma' x_1 + u_1, \quad (1)$$

$$y_2^* = \delta' x_2 + u_2, \quad (2)$$

where x_1 and x_2 are exogenous variables described above as determinants of psychological well-being and living arrangements, respectively, and the error terms u_1 and u_2 are assumed to have a standard bivariate normal distribution with correlation coefficient ρ (see Greene & Hensher, 2010, for a recent survey on ordered response models). The determinants of psychological well-being are chosen broadly along the lines of the literature on subjective well-being and described in detail in *Measures* section (see Dolan, Peasgood, & White, 2008, for a review of the literature on subjective well-being). The conceptual framework underlying our approach is not restricted to any particular model of family decision making.

Assuming that identification conditions are satisfied, all parameters in Equations (1) and (2) can be jointly estimated by maximum likelihood methods. To better understand the quantitative importance of living arrangements as a factor determining psychological well-being, we calculate the expected value of psychological well-being as $\bar{y}_1 = \sum_{j=0}^{10} \sum_{k=0}^{J} \Pr(y_{1i} = j, y_{2i} = k) j$, where $\Pr(y_{1i} = j, y_{2i} = k)$ denotes the probability that $y_{1i} = j$ and $y_{2i} = k$ for $j = \{0, 1, 2, \ldots, 10\}$ and $k = \{0, 1\}$, and report the difference in predicted values between when the older adults live with their children and when they do not as the partial effect of coresidence. Moreover, to examine the implications for well-being differentials across regions, we calculate the counterfactual psychological well-being, if there was no difference in living arrangements among the older adults by subtracting the impact of living arrangements as $y_{1i}^{cf} = y_{1i} - \left(\bar{y}_1 - \bar{y}_1^{cf}\right)$, where $\bar{y}_1$ is the predicted value, $\bar{y}_1^{cf}$ is the predicted value evaluated at the national rate of coresidence, and the difference between the two represents the partial effect of coresidence arising from the deviation from the national mean.

Estimating the effect of y_2^* on y_1^* requires using an exogenous variable that is included in x_2 but excluded from x_1. We therefore need an instrumental variable that affects psychological well-being solely through living arrangements. In this context, such a variable is typically unavailable in regional surveys (Knodel et al., 2000; Silverstein et al., 2006), making it very hard to establish the causality. Do and Malhotra (2012) use the number of sons and an indicator for whether the eldest child is a daughter as instrumental variables (They assume the cardinality of the depression scale and fit the linear regression model, whereas we do not assume the cardinality of the psychological well-being scale and estimate the simultaneous-equation discrete-response model). However, these instrumental variables might not be legitimate, because there are various channels other than

living arrangements, such as money and time transfers and son preference, through which the number and composition of children can influence psychological well-being.

Recognizing the fact that 96% of the older adults in the sample have lived in the current commune for more than 20 years, intergenerational coresidence is considered to be a consequence of the choice of adult children's residential location. Adult children may decide their residential location individually or jointly with their elderly parents and other family members. In either case, abundant evidence indicates that migration tends to occur when the expected improvement of economic opportunities and outcomes in the destination exceeds costs of migration, along the lines of the economic theory of migration (see Greenwood, 1997; Lucas, 1997, for surveys and Kennan & Walker, 2011; Saks & Wozniak, 2011, for recent studies). The fact that many people do not migrate, despite significant differences in expected lifetime earnings across regions, implies that the pecuniary and nonpecuniary costs of migration are large. Nonetheless, as in other countries, economic incentives are relevant to internal migration in Vietnam for young adults who expect to work for many years until retirement. Dang and colleagues (1997) show that migration flows are highly correlated with regional economic conditions and the origin–destination distance using the 1984 and 1989 Population Census of Vietnam. According to the 2009 Population Census of Vietnam, migrant receiving regions are the Southeast and the Central Highlands, which have experienced and are expected to experience greater rates of economic development.

In fact, there is considerable regional variation in economic and labor market conditions in Vietnam (Table 1). The monthly income per capita is highest in the Southeast; the region includes Ho Chi Minh City, at 2,304,000 Vietnamese dong (approximately 110 U.S. dollars as of December 2011), which is 2.5 times as high as that in the lowest income region (the Northern Uplands) and 1.5 times as high as that in the second highest income region (the Red River Delta, the region including Hanoi). The unemployment rate is highest in the Mekong River Delta at 2.8%, which is 2.1 times as high as that in the Central Highlands and 3.2 times as high as that in the Northern Uplands. The unemployment rate is nationally low, according to not only the Labour Force Survey but also the Household Living Standards Survey. The main reasons are that the income levels are generally low and that the self-employment jobs are widely available (Gallup, 2004). The unemployment rate outside the region, measured as the distance-weighted average of unemployment rate in the other regions, is highest at 2.3%, which is 1.4 times as high as that in the Central Coast and 2.1 times as high as that in the Red River Delta. Importantly, regions with higher unemployment rates outside the region tend to have higher rates of intergenerational coresidence. In other words, adult children are more likely to stay in the current region when there are fewer labor market opportunities in other neighboring regions, as the economic theory of migration predicts. At the same time, we would expect that the unemployment rate outside the region is not likely to have a significant direct effect on the psychological well-being of the older adults in any given year, holding the unemployment rate in the current region constant. Therefore, we use the unemployment rate outside the region as an instrumental variable after including the unemployment rate in the current region as a control variable both in x_1 and x_2 in Equations (1) and (2). To be clear, we do not assume that labor market conditions have no influence on the psychological well-being of the older adults. To be precise, the assumption we make is that the distance-weighted average of unemployment rates in the *other* regions has an effect on the psychological well-being of the older adults solely through living arrangements conditional on the national, regional, and household characteristics, including demographics, functional health, assets, intergenerational transfers, and economic and labor market conditions.

Results

In this section, we compare the older adults' characteristics by living arrangements, and present estimation results regarding the impact of living arrangements on psychological well-being. We also discuss the implications of living

Table 1. Local Economic and Labor Market Conditions and Living Arrangements

	Monthly income per capita	Unemployment rate	Unemployment rate outside the region	Coresidence rate	Coresidence rate incl. quasi-coresidence
	(1,000 VND)	(%)	(%)	(%)	(%)
Northern Uplands	905 (6)	0.87 (6)	1.87 (3)	61.3 (4)	69.7 (5)
Red River Delta	1,580 (2)	1.81 (4)	1.10 (6)	56.1 (6)	69.1 (6)
Central Coasts	1,018 (5)	2.28 (2)	1.62 (5)	60.4 (5)	75.6 (4)
Central Highlands	1,088 (4)	1.31 (5)	2.12 (2)	70.1 (3)	76.5 (3)
Southeast	2,304 (1)	1.97 (3)	2.32 (1)	78.3 (1)	93.0 (1)
Mekong River Delta	1,247 (3)	2.77 (1)	1.83 (4)	75.0 (2)	89.0 (2)

Note. Ranks are in parentheses.

Data sources: Labour Force Survey for unemployment rates, Household Living Standards Survey for monthly income per capita, Vietnam Aging Survey for coresidence rates.

arrangements for regional inequality in well-being among the older adults.

Descriptive Analysis

Table 2 presents the sample means and standard deviations of variables used in the analysis for the full sample and separately for those who live with their children and those who do not. The older adults who live with their children have better psychological well-being than the older adults who do not live with their children. Although the difference is less apparent, all five component indices exhibit higher scores for the older adults who live with their children than the older adults who do not. We consider the difference in psychological well-being to be related to issues of elderly care as well as filial piety. In Vietnam, family members are the main providers of care for the older adults. Of the older adults in the sample, 220 older adults need and receive help for ADL, and 143 older adults expect to receive help in the future. Virtually all of the older adults are taken care of by their family members, and very few of the older adults wish to rely on professional caregivers and health workers in the future (Figure 1), suggesting that there is a lack of close substitutes for family support. Daughters and daughters-in-law bear a central role in instrumental support to elderly parents. Eighty percent of the older adults are taken care of by their daughters or daughters-in-law, whereas 41% and 40% are taken care by spouses and sons or sons-in-law, respectively. Eighty-three percent of the older adults would like their daughters or daughters-in-law to take care of them, whereas 24% and 51% would like spouses and sons or sons-in-law, respectively, to take care of them.

The older adults who live with their children tend to have a greater number of sons and a greater number of children providing financial and in-kind transfers. These observations are consistent with the results of Knodel and colleagues (2000), who examine living arrangements and intergenerational transfers using two regional surveys conducted in the Red River Delta and in Ho Chi Minh City and environs.

Regression Analysis

Main Findings

Table 3 presents parameter estimates along with standard errors clustered at the regional level (There may be a concern about underestimation of standard errors due

Table 2. Summary Statistics

	Full sample		Coresidence		Non-coresidence	
	Mean	(*SD*)	Mean	(*SD*)	Mean	(*SD*)
Psychological well-being	6.81	(2.23)	6.96	(2.14)	6.51	(2.37)
Depression (not feeling depressed)	1.39	(0.70)	1.41	(0.69)	1.36	(0.71)
Loneliness (not feeling lonely)	1.55	(0.62)	1.58	(0.60)	1.49	(0.66)
Happiness (feeling happy)	1.68	(0.60)	1.73	(0.55)	1.59	(0.67)
Appetite (having an appetite)	1.27	(0.71)	1.28	(0.71)	1.26	(0.70)
Sleep (not having insomnia)	0.91	(0.77)	0.95	(0.77)	0.82	(0.77)
Coresidence (binary)	0.66	(0.47)	1.00	(0.00)	0.00	(0.00)
Coresidence incl. quasi-coresidence (binary)	0.80	(0.40)	1.00	(0.00)	0.41	(0.49)
Male (binary)	0.46	(0.50)	0.44	(0.50)	0.49	(0.50)
Age	69.8	(7.86)	69.7	(7.95)	69.8	(7.68)
Children's age	38.8	(7.70)	38.6	(7.94)	39.0	(7.21)
Married (binary)	0.76	(0.43)	0.74	(0.44)	0.79	(0.41)
Number of sons	2.48	(1.49)	2.59	(1.50)	2.26	(1.46)
Number of daughters	2.38	(1.55)	2.35	(1.55)	2.42	(1.55)
Any grandchildren (binary)	0.97	(0.16)	0.96	(0.19)	0.99	(0.09)
No religion (binary)	0.15	(0.36)	0.16	(0.37)	0.13	(0.34)
Assets	0.46	(0.28)	0.46	(0.27)	0.47	(0.28)
Functional limitations	0.80	(1.67)	0.83	(1.75)	0.74	(1.49)
North regions (binary)	0.45	(0.50)	0.39	(0.49)	0.58	(0.49)
Log income per capita	7.26	(0.28)	7.28	(0.29)	7.24	(0.26)
Unemployment rate	2.14	(0.45)	2.17	(0.46)	2.08	(0.43)
Unemployment rate outside the region	1.67	(0.44)	1.73	(0.44)	1.56	(0.43)
Number of children helping financially	3.64	(3.96)	3.71	(3.87)	3.51	(4.15)
Number of children giving a gift	2.06	(3.20)	2.29	(3.44)	1.60	(2.62)
Number of observations	2,225		1,399		826	

Note. Psychological well-being is measured on a scale ranging from 0 to 10 in terms of depression, loneliness, happiness, appetite, and sleep. Functional limitations are measured on a scale ranging from 0 to 24 in terms of activities of daily living and instrumental activities of daily living limitations. Assets are measured in 10 millions of Vietnamese dong. Unemployment rate outside the region is the distance-weighted average of unemployment rates in the other regions.

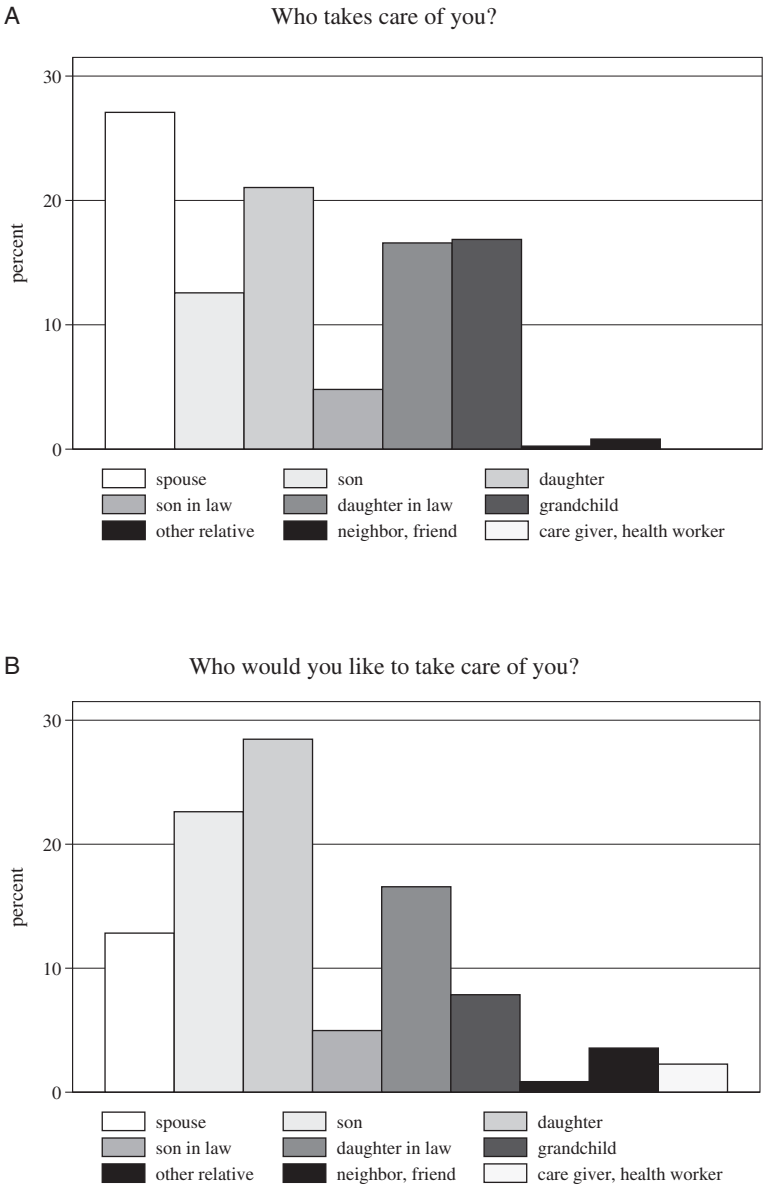

Figure 1. Elderly care. (**A**) Who takes care of you? (**B**) Who would you like to take care of you? Multiple answers are allowed. The first question is asked to the older adults who need and receive help for one or more activities of daily living limitations, whereas the second question is asked to the older adults who currently need no help but expect to receive help in the future.

to a small number of clusters; however, we find that the clustering-robust standard error of the estimated coefficient on coresidence is greater than the heteroscedasticity-robust standard error). The first two and last two columns present the results for living arrangements and psychological well-being when excluding and including quasi-coresidence, respectively. First, the unemployment rate outside the region is highly and positively correlated with intergenerational coresidence (with a *t*-statistic of 5.5), making it possible to identify the impact of intergenerational coresidence on psychological well-being. The correlation coefficient of the error terms is significant and negative, indicating that coresidence is endogenous and that the older adults who have lower mental health status are more likely to live with and close to their children. If the endogeneity of coresidence is ignored, the impact of coresidence on well-being will be biased downward. Our estimation results indicate that intergenerational coresidence has a positive and significant impact on the psychological well-being of the older adults. The partial effect of coresidence corresponds to 38% of the mean psychological well-being (=100×2.59 / 6.81). After including quasi-coresidence, the effect becomes weaker but remains significant.

In addition, we find that the older adults who are male and married and have a grandchild, fewer functional limitations, and no religion tend to have higher psychological well-being. Those who have more assets and a greater number of children providing financial and in-kind transfers

Table 3. Living Arrangements and Psychological Well-Being of the Older Adults

	Coresidence		Well-being		Coresidence incl. quasi-coresidence		Well-being	
Coresidence			1.09	(0.12)				
Coresidence incl. quasi-coresidence							0.91	(0.28)
Male	−0.13	(0.11)	0.29	(0.07)	−0.01	(0.14)	0.25	(0.04)
Age/10	0.05	(0.14)	−0.12	(0.08)	0.05	(0.16)	−0.13	(0.06)
Children's age/10	−0.12	(0.15)	0.14	(0.14)	−0.02	(0.17)	0.11	(0.11)
Married	−0.07	(0.14)	0.41	(0.11)	−0.09	(0.09)	0.42	(0.09)
Number of sons	0.10	(0.03)	−0.10	(0.04)	0.14	(0.02)	−0.11	(0.04)
Number of daughters	−0.01	(0.03)	−0.02	(0.04)	0.02	(0.02)	−0.04	(0.03)
Any grandchildren	−0.94	(0.29)	0.41	(0.24)	−0.62	(0.22)	0.26	(0.15)
No religion	0.09	(0.05)	0.02	(0.04)	−0.10	(0.19)	0.10	(0.02)
Assets	0.18	(0.17)	0.43	(0.11)	−0.01	(0.21)	0.56	(0.15)
Functional limitations	0.03	(0.03)	−0.17	(0.02)	0.02	(0.03)	−0.17	(0.02)
North regions	−0.14	(0.05)	0.13	(0.04)	−0.19	(0.07)	0.14	(0.08)
Log income per capita	0.30	(0.11)	−0.06	(0.10)	0.54	(0.12)	−0.10	(0.12)
Unemployment rate	0.11	(0.05)	−0.14	(0.05)	0.25	(0.07)	−0.18	(0.07)
Unemployment rate outside the region	0.31	(0.06)			0.45	(0.05)		
Number of children helping financially			0.03	(0.01)			0.03	(0.01)
Number of children giving a gift			0.04	(0.01)			0.04	(0.01)
Correlation coefficient (ρ)			−0.64	(0.10)			−0.52	(0.11)
Partial effect of coresidence			2.59				1.94	

Note. Psychological well-being is measured on a scale ranging from 0 to 10 in terms of depression, loneliness, happiness, appetite, and sleep. Functional limitations are measured on a scale ranging from 0 to 24 in terms of activities of daily living and instrumental activities of daily living limitations. Assets are measured in 10 millions of Vietnamese dong. Unemployment rate outside the region is the distance-weighted average of unemployment rates in the other regions. Standard errors in parentheses are clustered at the regional level.

Table 4. Component Well-Being

	Depression	Loneliness	Happiness	Appetite	Sleep
	(not feeling depressed)	(not feeling lonely)	(feeling happy)	(having an appetite)	(not having insomnia)
Coresidence	1.20	−0.42	1.54	1.14	0.79
	(0.53)	(0.46)	(0.44)	(0.22)	(0.45)
Coresidence incl.	0.97	1.66	1.28	1.11	0.36
quasi-coresidence	(0.39)	(1.04)	(1.06)	(0.13)	(0.23)

Note. Psychological well-being is measured on a scale ranging from 0 to 10 in terms of depression, loneliness, happiness, appetite, and sleep. Functional limitations are measured on a scale ranging from 0 to 24 in terms of activities of daily living and instrumental activities of daily living limitations. Assets are measured in 10 millions of Vietnamese dong. Unemployment rate outside the region is the distance-weighted average of unemployment rates in the other regions. Standard errors in parentheses are clustered at the regional level.

also tend to have higher psychological well-being, indicating a positive link between economic status and psychological well-being. Holding other factors constant, while the probability of coresidence increases with an increase in the number of sons, psychological well-being decreases. The latter result may reflect the fact that the providers of instrumental support to the older adults are more likely to be daughters and daughters-in-law.

Component Well-Being

It is fairly standard to measure psychological well-being by a single aggregate index in the literature. The advantage of using the aggregate index is that we can analyze the overall psychological well-being that consists of various affects and somatic symptoms. There are a few disadvantages about which we might be concerned, however. First, the overall score depends on question items included, despite the fact that questionnaires are fairly standardized, and thus, it is not readily possible to compare the size of estimated effects across studies using different surveys. Second, the same score is given to all kinds of affects and symptoms that occur with the same frequency. To circumvent these aggregation problems, we examine the effects on each component of psychological well-being. Table 4 presents the estimated coefficients on living arrangements obtained from the separate regressions of five types of affects and symptoms. We find that the results for component well-being are broadly consistent with the results for overall well-being in Table 3.

The effect of coresidence remains strong for happiness, depression, and appetite and becomes weak for insomnia. The results for loneliness are mixed. The effect of coresidence is insignificant when excluding quasi-coresidence but significant when including quasi-coresidence.

Gender

Elderly men tend to report higher psychological well-being than elderly women in Vietnam. To understand the role of living arrangements in gender difference in the elderly well-being, we repeat the analysis after splitting the sample by gender. Table 5 presents the estimated coefficients on living arrangements obtained from the separate regressions of overall well-being for 932 men and 1,293 women. For men, coresidence has a positive and significant effect, whereas it is statistically insignificant when including quasi-coresidence. For women, coresidence is statistically insignificant at the 10% level, whereas it has a positive and significant effect when including quasi-coresidence. The coefficient on coresidence is 2.3 times larger for men than for women, and its partial effect is statistically larger for men than for women. The results can be interpreted as indicating that elderly men are psychologically more dependent on their children living together than elderly women. To test the difference in partial effects, we perform an instrumental variable estimation for the full sample (including men and women), where we interact an endogenous variable (coresidence) and an instrumental variable (unemployment rate outside the region) with a male binary variable and add them into the determinants of psychological well-being and living arrangements, respectively. The difference in the partial effects of coresidence between men and women is 0.84 with a standard error of 0.42, meaning that the partial effect is 2.6 times larger for men than for women. This result is consistent with that of Tiedt (2013), who find a greater protective effect of coresidence for elderly men than for elderly women in Japan, and that of Jeon, Jang, Rhee, Kawachi, and Cho (2007), who find an association between living alone and depressive symptoms for elderly men but not for elderly women in Korea.

Simulation Analysis

A recent study by Oswald & Wu (2011) demonstrates regional well-being differentials and examines the role of income; however, other possible causes of well-being differentials have yet to be fully examined. In Vietnam, there are significant differences in living arrangements across regions, and differences in living arrangements can result in differences in psychological well-being among the older adults. We end this section by discussing the current status of regional well-being differentials and examining the influence of regional differences in living arrangements. Figure 2A illustrates regional well-being differentials as the percentage deviation of the regional mean from the national mean. Psychological well-being tends to be higher for the older adults in the Southeast and the Central Highlands by 5.4% and 3.0%, respectively, and lower for the older adults in the Central Coasts and the Mekong River Delta by 4.8% and 3.8%, respectively. On the other hand, as seen in Table 1, the coresidence rate tends to be higher in southern regions than in northern regions. More specifically, the coresidence rate is highest in the Southeast, where psychological well-being is highest, whereas it is second lowest in the Central Coasts, where psychological well-being is lowest.

We now examine to what extent regional well-being differentials can be explained by regional differences in living arrangements. To measure the quantitative contribution of living arrangements to regional well-being differentials, we calculate the counterfactual psychological well-being if there was no regional difference in intergenerational coresidence among the older adults in the manner described in *Model* section. Figure 2B illustrates regional well-being differentials, if there was no regional difference in intergenerational coresidence. Holding the coresidence rate fixed at the national mean, psychological well-being in the Southeast and the Central Highlands is higher than the national mean by only 0.8% and 1.2%, respectively, while it remains higher in the Red River Delta and lower in the Mekong River Delta. These results indicate that higher psychological well-being in the Southeast and the Central Highlands can be largely explained by higher rates of intergenerational coresidence, whereas well-being differentials in other regions cannot be explained by intergenerational coresidence alone. The latter result may not be surprising in light of significant differences in other social and economic factors determining psychological well-being across regions. The former result implies that one can formulate a better policy to reduce well-being inequality among the older adults by taking into account their living arrangement preferences.

Table 5. Male and Female Well-Being

	Male	Female
Coresidence	1.16	0.50
	(0.38)	(0.33)
Coresidence incl. quasi-coresidence	0.75	0.53
	(0.93)	(0.20)

Note. Psychological well-being is measured on a scale ranging from 0 to 10 in terms of depression, loneliness, happiness, appetite, and sleep. Standard errors in parentheses are clustered at the regional level.

Discussion and Conclusions

In this study, we have examined the relationship between living arrangements and psychological well-being of the older adults in Vietnam. By exploiting differences in labor market opportunities in neighboring regions as exogenous variation in living arrangements, we have found that intergenerational coresidence has a positive and significant

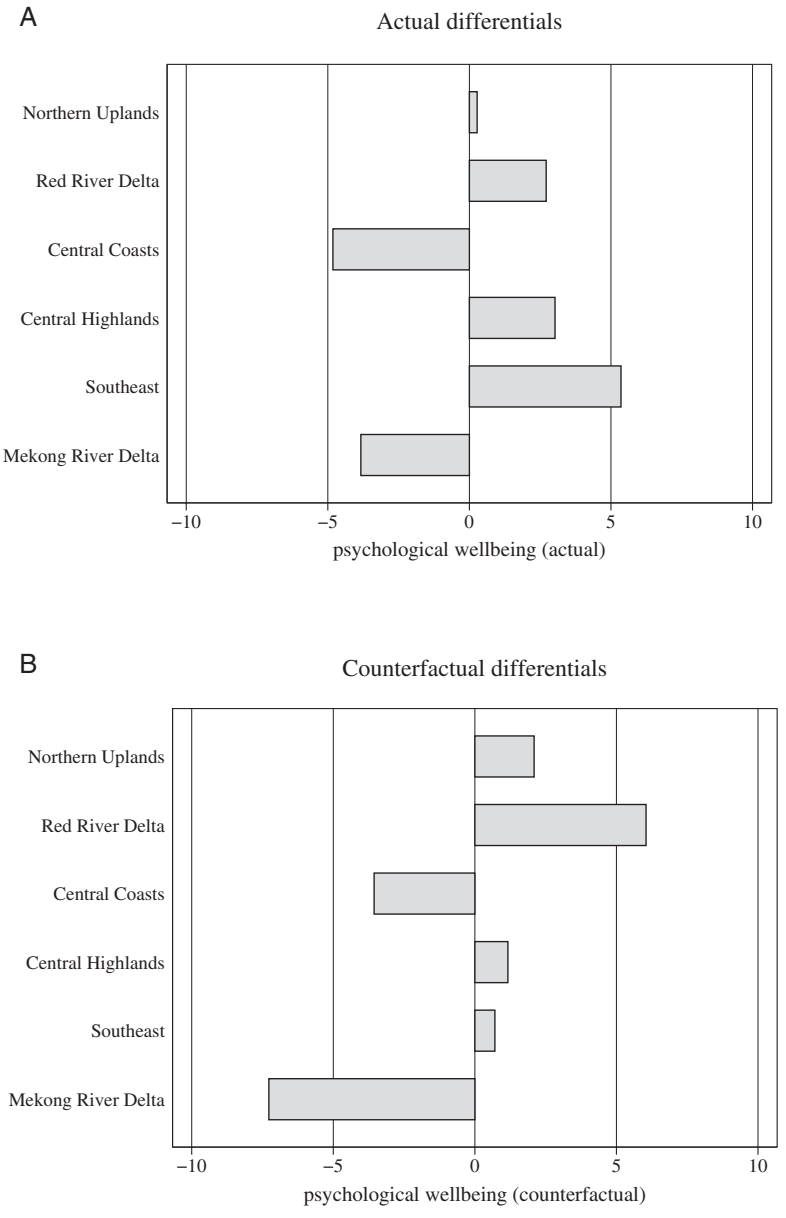

Figure 2. Regional well-being differentials. (**A**) Actual differentials. (**B**) Counterfactual differentials. The bars represent percentage deviations from the national mean. Counterfactual differentials are regional well-being differentials holding coresidence rates fixed at the national mean.

impact on the psychological well-being of the older adults, and the impact becomes greater when accounting for the simultaneity between living arrangements and psychological well-being. As a result, our study reinforces the findings of previous studies on living arrangements and psychological well-being of the older adults, such as Silverstein and colleagues (2006) in China, Do and Malhotra (2012) in Korea, and Tiedt (2013) in Japan among others. At the same time, we have extended the previous studies in a number of ways. First, we have relaxed the assumption of cardinality of well-being scores. Second, and more importantly, we have utilized the distance-weighted average of unemployment rate in the other regions as an instrumental variable, which is arguably more exogenous than the number and composition of children in a family used in the analysis of Do and Malhotra (2012). Finally, we have confirmed that our results are fairly robust, even after taking quasi-coresidence into account, decomposing the psychological well-being index into each affect and symptom, and splitting the sample by gender. Furthermore, our study complements the results of a recent study by Samanta, Chen, and Vanneman (2014), who find a positive association between intergenerational coresidence and physical health of the older adults in India.

The main findings of this study can also be summarized as follows. When there are more labor market opportunities in neighboring regions, adult children are less likely to stay with and close to their elderly parents, and consequently, elderly parents tend to have lower psychological well-being. From this point of view, our study sheds light

on the pathway by which the economic transition influences the psychological well-being of the older adults. At the same time, it provides an additional point of reference in the emerging literature on the migration of adult children and the mental and physical health of elderly parents, including Giles and Mu (2007) and Guo, Aranda, and Silverstein (2009) in China, Kuhn, Everett, and Silvey (2011) in Indonesia, and Antman (2010) in Mexico, where there is no consensus yet about the relationship between children's migration and parental health.

The key implications of our results are that well-being differentials can increase among the older adults between those in more developed regions whose children are more likely to stay together and those in less developed regions whose children are more likely to live apart, although regional wage differentials may decrease in the future along with an increased supply of labor in more economically developed regions by internal migration as the economic theory of labor markets predicts (Blanchard & Katz, 1992). This means that, concerns about well-being inequality remain unresolved, even though a mechanism that can reduce regional wage inequality is embedded in labor markets. From a policy perspective, the findings of this paper point to the need for attention to the mental health of elderly parents left behind in less economically developed regions.

The results discussed in this paper are derived from a nationally representative sample of the older adults in Vietnam, where Confucian values prevail and the State's role in elderly support (including public pension, health care, and long-term care) remains largely underdeveloped. An interesting but challenging question is to what extent culture and institutions can account for the relationship between living arrangements and psychological well-being of the older adults. Further research in other countries and other time periods is needed to disentangle the effects of culture and institutions. As Hermalin (2002) and Chan (2005) conclude that family support for the older adults in developing Asian countries has not deteriorated in ways that the classic modernization theory predicts, the causes of the decline in the rate of coresidence are complex. By doing so, however, it is possible to deepen the understanding of differences and changes in living arrangement preferences of the older adults. The approach proposed in this study is promising for future investigation.

Funding

The study was supported by Singapore Management University's Office of Research (C242/MSS13S003).

Acknowledgments

We thank Christine Ho, Seonghoon Kim, Merril Silverstein, and Stewart Tolnay, anonymous referees, and participants at the Kansai Labor Workshop and the Singapore Health Economics Association Conference for helpful comments. We gratefully acknowledge Vietnam's Institute of Social and Medical Studies for permission to use the Vietnam Aging Survey. K. Yamada conducted the analysis and wrote the paper. B. Teerawichitchainan contributed to planning the study and writing the paper.

References

Antman, F. M. (2010). Adult child migration and the health of elderly parents left behind in Mexico. *American Economic Review Papers and Proceedings*, **100**, 205–208. doi:10.1257/aer.100.2.205

Barbieri, M. (2009). Doi Moi and older adults: Intergenerational support under the constraints of reform. In M. Barbieri & D. Belanger (Eds.), *Reconfiguring families in contemporary Vietnam* (pp. 133–165). Stanford, CA: Stanford University Press.

Blanchard, O. J., & Katz, L. F. (1992). Regional evolutions. *Brookings Papers on Economic Activity*, **1**, 1–61.

Chan, A. (2005). Aging in southeast and east Asia: Issues and policy directions. *Journal of Cross-Cultural Gerontology*, **20**, 269–284. doi:10.1007/s10823-006-9006-2

Cheng, S.-T., & Chan, A. C. M. (2006). Filial piety and psychological well-being in well older Chinese. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **61**, 262–269. doi:10.1093/geronb/61.5.P262

Croll, E. J. (2006). The intergenerational contract in the changing Asian family. *Oxford Development Studies*, **34**, 473–491. doi:10.1080/13600810601045833

Dang, A., Goldstein, S., & McNally, J. (1997). Internal migration and development in Vietnam. *International Migration Review*, **31**, 312–337.

Do, Y. K., & Malhotra, C. (2012). The effect of coresidence with an adult child on depressive symptoms among older widowed women in South Korea: An instrumental variables estimation. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **67**, 384–391. doi:10.1093/geronb/gbs033

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, **29**, 94–122. doi:10.1016/j.joep.2007.09.001

Filmer, D., & Pritchett, L. H. (2001). Estimating wealth effects without expenditure data–or tears: An application to educational enrollments in states of India. *Demography*, **38**, 115–132. doi:10.1353/dem.2001.0003

Gallup, J. L. (2004). The wage labor market and inequality in Vietnam. In P. Glewwe, N. Agrawal, & D. Dollar (Eds.), *Economic growth, poverty, and household welfare in Vietnam* (pp. 53–93). The World Bank.

General Statistics Office of Vietnam (2011). *Migration and urbanization in Vietnam: Patterns, trends and differentials*. General Statistics Office of Vietnam.

Giles, J., & Mu, R. (2007). Elderly parent health and the migration decisions of adult children: Evidence from rural China. *Demography*, **44**, 265–288. doi:10.1353/dem.2007.0010

Glewwe, P. (2004). An overview of economic growth and household welfare in Vietnam in the 1990s. In P. Glewwe, N. Agrawal, & D. Dollar (Eds.), *Economic growth, poverty, and household welfare in Vietnam* (pp. 1–26). The World Bank.

Greene, W. H., & Hensher, D. A. (2010). *Modeling ordered choices: A primer*. Cambridge, UK: Cambridge University Press.

Greenwood, M. J. (1997). Internal migration in developed countries. *Handbook of Population and Family Economics*, **1B**, 647–720. doi:10.1016/S1574-003X(97)80004-9

Guo, M., Aranda, M. P., & Silverstein, M. (2009). The impact of out-migration on the inter-generational support and psychological wellbeing of older adults in rural China. *Ageing and Society*, **29**, 1085–1104. doi:10.1017/S0144686X0900871X

Hermalin, A. I. (2002): *The well-being of the elderly in Asia: A four-country comparative study*. Ann Arbor, MI: University of Michigan Press.

Jeon, G.-S., Jang, S.-N., Rhee, S.-J., Kawachi, I., & Cho, S.-I. (2007). Gender differences in correlates of mental health among elderly Koreans. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **62**, 323–329. doi:10.1093/geronb/62.5.S323

Kennan, J., & Walker, J. R. (2011). The effect of expected income on individual migration decisions. *Econometrica*, **79**, 211–251. doi:10.3982/ECTA4657

Knodel, J., Friedman, J., Truong, S. A., & Bui, T. C. (2000). Intergenerational exchanges in Vietnam: Family size, sex composition, and the location of children. *Population Studies*, **54**, 89–104. doi:10.1080/713779067

Kuhn, R., Everett, B., & Silvey, R. (2011). The effects of children's migration on elderly kin's health: A counterfactual approach. *Demography*, **48**, 183–209. doi:10.1007/s13524-010-0002-3

Lucas, R. E. (1997). Internal migration in developing countries. *Handbook of Population and Family Economics*, **1B**, 721–798. doi:10.1016/S1574-003X(97)80005-0

Oswald, A. J., & Wu, S. (2011). Well-being across America. *Review of Economics and Statistics*, **93**, 1118–1134. doi:10.1162/REST_a_00133

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, **1**, 385–401. doi:10.1177/014662167700100306

Saks, R. E., & Wozniak, A. (2011). Labor reallocation over the business cycle: New evidence from internal migration. *Journal of Labor Economics*, **29**, 697–737. doi:10.1086/660772

Samanta, T., Chen, F., & Vanneman, R. (2014). Living arrangements and health of older adults in India. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, forthcoming. doi:10.1093/geronb/gbu164

Silverstein, M., Cong, Z., & Li, S. (2006). Intergenerational transfers and living arrangements of older people in rural China: Consequences for psychological well-being. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **61**, 256–266. doi:10.1093/geronb/61.5.S256

Tiedt, A. D. (2013). Cross-national comparisons of gender differences in late-life depressive symptoms in Japan and the United States. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **68**, 443–454. doi:10.1093/geronb/gbt013

United Nations (2013). *World population prospects: The 2012 revision*. United Nations.

Vietnam Women's Union (2012). *Vietnam Aging Survey: Key findings*. Vietnam Women's Union. Retrieved from http://www.wpro.who.int/vietnam/vietnam_ageing_survey_2011.pdf

Ware, J. E. Jr., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care*, **30**, 473–483.

World Bank (2006). *Transport strategy: Transition, reform, and sustainable management*. The World Bank.

Zhang, Z., Gu, D., & Luo, Y. (2014). Coresidence with elderly parents in contemporary China: The role of filial piety, reciprocity, socioeconomic resources, and parental needs. *Journal of Cross-Cultural Gerontology*, **29**, 259–276. doi:10.1007/s10823-014-9239-4